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AMBLYELEOTRIS RANDALLI, A NEW SPECIES OF GOBIID FISH LIVING IN ASSOCIATION WITH ALPHAEID SHRIMPS

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ABSTRACT

A new species of *Amblyeleotris* is described based on seven specimens from the tropical western Pacific Ocean. The species lives in association with an alphaeid shrimp, as do many, if not all species of *Amblyeleotris*. The genus is characterised and contrasted with *Cryptocentrus*, a genus which is also associated with alphaeid shrimps. A list of distinctive species of *Amblyeleotris* is given, but does not include numerous undescribed species.

INTRODUCTION

Gobiid fishes are a world-wide group of tropical and temperate fishes occurring in freshwater, estuaries, and in the sea. The group contains about 2,000 species, making it one of the largest families of fishes in the world.

Early workers separated gobiid fishes from the related and more primitive eleotrids by the development of a sucking disc, formed by fusion of the pelvic fins in gobiids. Recent studies (Akihito 1969, Birdsong 1975, Miller 1973) have shown that this character is not adequate to separate the two groups, since many coral reef gobiids have secondarily lost the connection between the pelvic fins. Few true eleotrids occur on coral reef, most being found in freshwater or estuaries. Only four highly specialised eleotrids occur

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on coral reefs; *Calumia*, *Allomicrodesmus*, *Xenisthmus* and an undescribed genus. The genus *Amblyeleotris* has been regarded as an eleotrid, since the pelvic fins are separate, but it is a true gobiid, having 5 branchiostegal rays and a pelvic girdle characteristic of gobiids. Studies of coral reef genera by the senior author indicate that most speciose coral reef genera have species with the disc and others without it. In some species of *Fusigobius*, the degree of connection of the pelvic fins varies geographically and is sometimes sexually dimorphic.

The species of *Amblyeleotris* described here normally lives in association with alphaeid shrimps. Several gobiid species placed in various genera have been recorded living in association with alphaeids; *Cryptocentrus* (Magnus 1967, Klausewitz 1960), *Amblyeleotris* (Harada 1969, Klausewitz 1969, 1974a, Yanagasawa 1976, Polunin and Lubbock 1977), *Vanderhorstia* (Magnus 1967, Klausewitz 1974b), *Ctenogobiops* (Klausewitz 1960), *Lotilia* (Klausewitz 1960) and *Psilogobius* (Baldwin 1972). Studies on *Cryptocentrus cryptocentrus* have shown that the shrimp digs the burrow and the goby serves as a sentry at the burrow entrance (Luther 1958, Magnus 1967, Karplus, *et al.* 1972). Our observations indicate that the gobies feed on organisms in the sand deposited by the alphaeids, but will also forage away from the burrow.

Several problems exist in the classification of gobiids which live in association with alphaeids. Many of the 20 nominal genera involved have not been adequately diagnosed. Consequently, in many cases species have been placed in genera, with which they have little affinity. In some cases, species which do not live with alphaeids have been incorrectly placed in *Cryptocentrus*. A generic diagnosis will be presented in a paper currently in preparation by the senior author. *Cryptocentrus* and *Amblyeleotris* are the two most speciose genera that live in association with alphaeid shrimps. *Cryptocentrus* contains about 40 nominal species and *Amblyeleotris* contains 15 species. Since there is considerable confusion regarding the classification of the group, a generic synonymy for *Amblyeleotris* is presented below.

METHODS

Type specimens are deposited in The Australian Museum, Sydney (AM); the Bernice P. Bishop Museum, Honolulu (BPBM); the British Museum (Natural History), London (BMNH); and the Western Australian Museum, Perth (WAM).

Except as indicated counts and measurements follow those given by Hubbs and Lagler (1958). The head length is taken to the upper attachment

of the opercular membrane. In most gobiids the first ray of the second dorsal and anal fins is simple and is included in ray counts in the general discussion. The last ray of these fins, as counted, is branched to the base, but it has been treated as two separate rays by some earlier workers. Bleeker, for example gave both counts, giving a range of counts, even when he had only a single specimen. The longitudinal scale count is taken from the upper attachment of the opercular membrane to the end of the hypural. The ctenoid scale row count is the longitudinal count of the ctenoid scales. Transverse scale counts are taken from the anal origin upward and forward to the first dorsal base (TRF) and from the anal origin upward and backward to the second dorsal fin base (TRB). Since the anterior scales are often crowded and irregularly placed, the TRB count generally shows less variation. Post dorsal scales is a count of the scale rows from the end of the second dorsal fin to the upper base of the caudal fin. The vertebral count includes the urostyle.

The generic synonomy is based on work of the senior author, including examination of types of the nominal genera, except for *Biat*, where only nontype material was examined.

TAXONOMY

AMBLYELEOTRIS BLEEKER

Amblyeleotris Bleeker 1874: 373 (type species: *Eleotris periophthalmus* Bleeker 1853, by original designation).

Biat Seale 1909: 532 (type species: *Biat luzonica* Seale 1909, by original designation).

Pteroculiops Fowler 1938: 133 (type species: *Pteroculiops guttatus* Fowler 1938, by original designation).

Zebreleotris Herre 1953: 191 (type species: *Zebreleotris fasciata* Herre 1953, by original designation).

Cryptocentrops Smith 1958: 152 (type species: *Cryptocentrops exillis* Smith 1958, by original designation).

Fereleotris Smith 1958: 152 (type species: *Amblyeleotris (Fereleotris) delicatulus* Smith 1958, by original designation).

Diagnosis

Cheek with transverse and longitudinal papillae rows; two longitudinal rows, uppermost extends posteriorly from fifth or sixth transverse row

(Fig. 1). Mandibular papillae reduced to a single enlarged papilla on each side of chin, set in a depression. Gill opening broad, extending from the upper opercular attachment below to well before the posterior margin of the preoperculum. Posterior body scales ctenoid, cycloid anteriorly. Second dorsal and anal rays I, 12 to 20. Head compressed, with eyes placed high on sides of head, interorbital much narrower than eye. Head pores present, 2 median unpaired interorbital pores. Pelvic fins connected or separate.

Superficially *Cryptocentrus* is quite similar to *Amblyeleotris*, but differs in several features. In *Cryptocentrus* the upper longitudinal cheek papilla row extends forward to the second or third transverse row, under the eye; the mandibular papillae are arranged in two parallel rows extending posteriorly on the sides of the chin; the gill opening is more restricted, ending below the posterior preopercular margin; scales are normally cycloid, except for 2 or 3 species; dorsal and anal rays vary from I,9 to 12; the pelvics generally are connected into a disc, but are separate in a few species. *Vanderhorstia*, *Ctenogobiops*, *Eilatia* and *Flabelligobius* are also similar in appearance to *Amblyeleotris*, but differ in having longitudinal papillae cheek rows, but no transverse rows.

As recognised here, the genus *Amblyeleotris* contains the following species: *A. fontanesii* (Bleeker), *A. gymnocephala* (Bleeker), *A. exilis* (Smith), *A. periophthalmus* (Bleeker), *A. fasciata* (Herre), *A. guttata* (Fowler), *A. japonica* Takagi, *A. delicatulus* (Smith), *A. steinitzi* (Klausewitz), *A. maculata* Yanagasawa, *A. sungami* (Klausewitz), and *A. aurora* (Polunin and Lubbock).

AMBLYELEOTRIS RANDALLI N. SP.

(Figs 1, 2 and 3)

Diagnosis

Second dorsal and anal I,12, pectoral rays 18-19. Pelvic fins completely separate. Midline of nape naked, sides scaled forward to above middle of operculum. Breast and pectoral base covered with small cycloid scales. Body with 54 to 63 scale rows. TRB 17-21. First dorsal fin with a large ocellated spot posteriorly. Head with 2 narrow transverse orange bands in life. Body with four thin transverse orange bands, sloping obliquely forward ventrally. First dorsal fin elevated.

Description

Based on 7 specimens 35 to 61 mm SL. An asterisk indicates the count of the holotype. The number in parenthesis indicates the number of specimens with a specific count.

First dorsal VI(7)*. Second dorsal I,12(7)*. Anal I,12(7)*. Pectoral 18-18(1), 19-18(2)*, 19-19(3), 20-20(1). Segmented caudal rays 17(7)*. Branched caudal rays 14(7)*. Branchiostegals 5(2).Vertebrae 10+16=26 (1). Longitudinal scale count 58(2), 62(1), 63(3)*, 65(1). Ctenoid scale rows: 42(1), 45(1), 46(1), 48(2)*. Transverse scales: TRB 17(1), 18(1), 20(3), 21(2)*. Circumpenduncular scales 20(3), 21(2)*. Post dorsal scales 11(2)*. Gill rakers on outer face of first arch 2+10(2)*, 3+11(1), 3+12(1)*. Measurements are given in Table 1.

Table 1: Measurements (in mm) of holotype and 4 paratypes of *Amblyeleotris randalli*, all females.

Character	Paratypes				Holotype
	BPBM 17058	AMS I 17901-001	BPBM 9444	WAM P 25235-021	BPBM 20809
Standard length	52.4	34.7	60.6	58.2	73.2
Head length	15.6	10.4	16.8	17.6	20.4
Head width at cheeks	8.4	6.5	-	-	10.6
Head depth at posterior preopercular margin	9.1	6.5	-	11.0	13.4
Body depth at anal origin	10.0	6.6	11.2	11.3	14.9
Caudal peduncle depth	6.0	3.9	6.5	6.6	7.9
Caudal peduncle length	7.7	6.6	9.8	9.7	12.6
Upper jaw length	6.8	4.5	7.8	8.1	8.9
Eye length	3.7	3.3	4.8	4.1	4.7
Snout length	3.8	2.5	4.6	4.1	5.5
Pectoral length	16.8	11.4	18.3	19.3	24.3
Pelvic length	15.8	11.7	17.8	18.3	22.0
Caudal length	17.3	10.4	21.3	20.2	28.9
Depressed dorsal length	18.5	12.7	19.0	18.5	26.0
First dorsal spine length	12.4	8.5	14.9	15.2	21.6
Second dorsal spine length	15.5	12.0	17.9	16.5	22.2
Third dorsal spine length	16.0	12.4	17.7	18.6	22.6
Base of second dorsal fin	16.4	11.0	18.0	16.4	19.8
Snout to anal origin	32.1	21.4	36.2	33.8	44.6

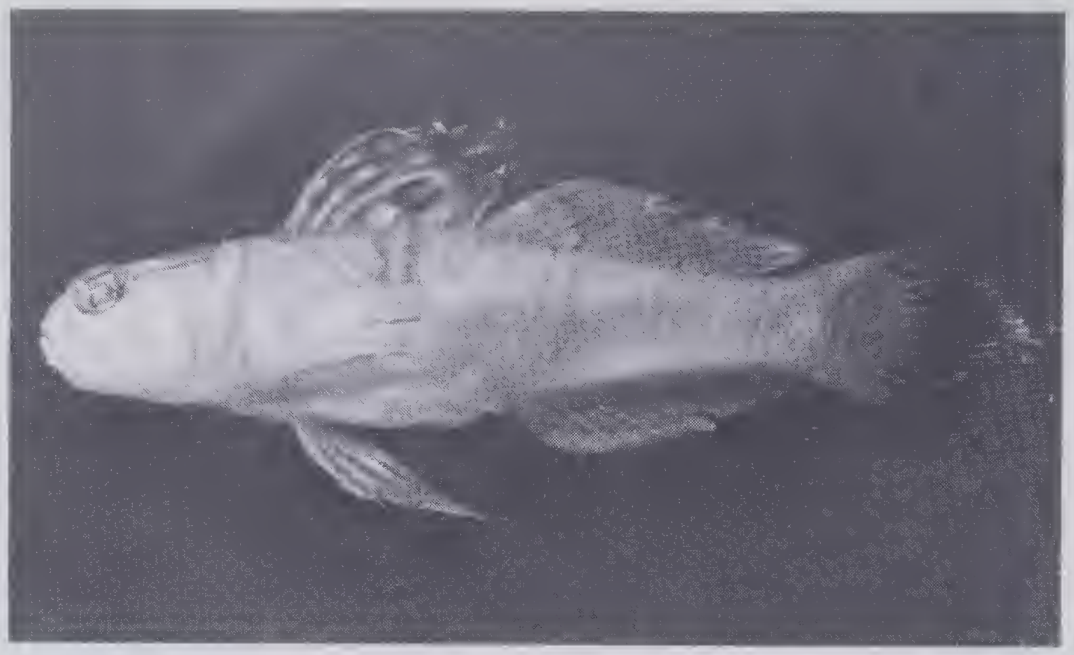

Fig. 1: Paratype of *Amblyeleotris randalli*, WAM P25235-021. Photo G. Allen.

Head moderately compressed, deeper than wide. Cheeks slightly bulbose. Body compressed. Mouth slightly oblique, forming an angle of about 30° with the body axis. Mouth terminal. Jaws extend posteriorly to a point under posterior margin of pupil. Snout steep in lateral view, about equal to eye diameter. Eye elevated slightly above interorbital region, with a very shallow groove behind the dorsoposterior margin of eye. Interorbital narrow, about equal to pupil diameter. Anterior nostril a short tube above upper lip. Posterior nostril a simple pore close to anterior margin of eye. Gill opening extends forward to below peroperculum, ending midway between end of eye and posterior preopercular margin. Gill rakers elongate on outer face of first arch; rakers on inner face of arch and on both faces of other arches, short, about as wide as long. Dorsal and anal rays branched. First dorsal fin higher than body depth, second, third and fourth spines longest and about equal in height. Pectoral fin elongate with pointed tip reaching to above anal origin; all but uppermost and 2 lowermost rays branched. Anal rays slightly more elongate than dorsal rays. Caudal fin assymetrically pointed, upper rays longer than lower rays. Pelvics I,5, soft rays all branched; fourth ray longest, fifth ray about one half length of fourth; interspinal membrane absent; two pelvics partly connected basally (**Fig. 2**).

Head pores: a nasal pore between anterior and posterior nostril; a median anterior and a median posterior interorbital pore; one postocular pore

behind each eye; an infraorbital pore on each side of head behind middle of eye; lateral canal extending from posterior end of eye to above preoperculum, with one pore behind eye and a terminal pore above the posterior preopercular margin; a short tube with pores at each end above operculum; three preopercular pores, lowest pore in horizontal line behind end of jaws. Pores and papillae shown in Fig. 3.

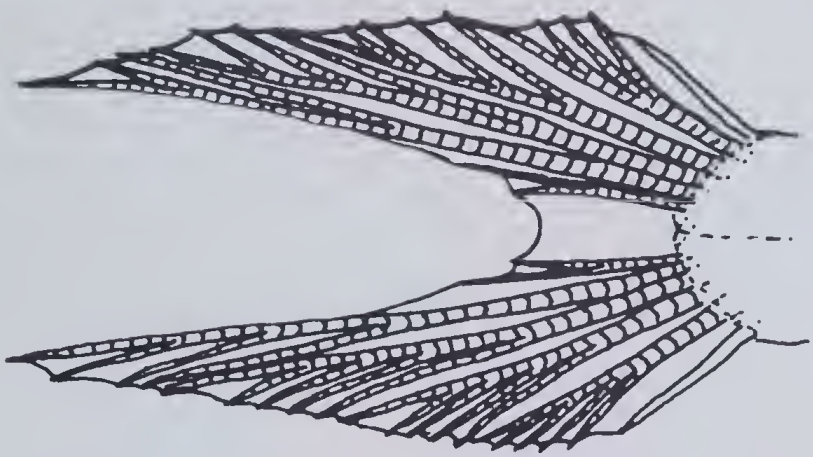

Fig. 2: Ventral view of pelvic fin of *Amblyeleotris randalli.* Drawing by H.K. Larson.

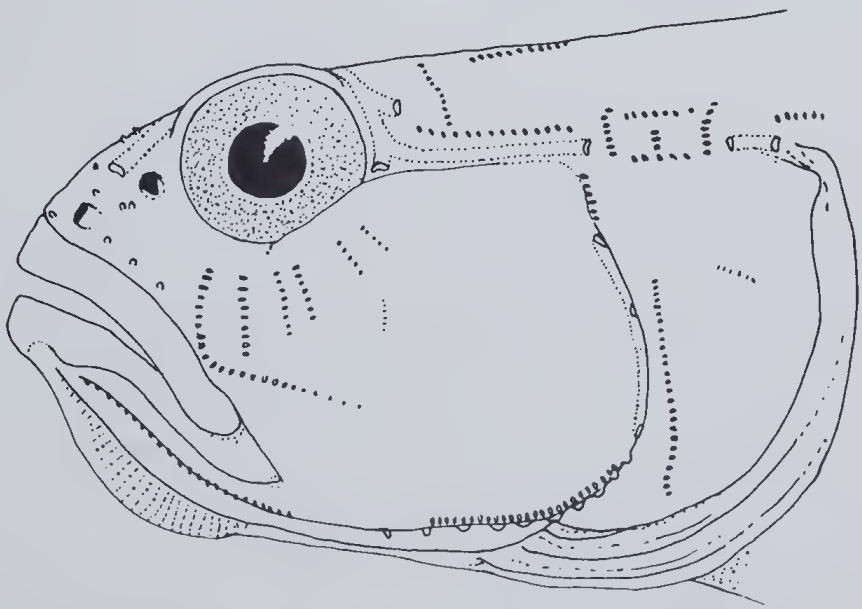

Fig. 3: Head of *Amblyeleotris randalli,* showing head canals and pores and sensory papillae pattern. Drawing by H.K. Larson.

Dentition: No vomerine or palatine teeth. All jaw teeth conical and curved. Upper jaw teeth in 4 rows; teeth in outer row distinctly larger than those in inner rows, largest anteriorly; three inner rows with small inwardly curved teeth, rows tapering posteriorly into one row. Lower jaw with 4 to 5 rows of teeth; outer row composed of 6 to 8 slightly enlarged teeth, confined to anterior margin of dentary; three to four inner rows of smaller teeth anteriorly, tapering posteriorly into a single row, innermost row with 1 or 2 very large teeth on each side, just behind angle of dentary.

Squamation: Body covered with 54 to 63 small scales, ctenoid posteriorly, cycloid anteriorly. Ctenoid scales extending forward in wedge, reaching between a point below second dorsal origin and middle of first dorsal fin. Pectoral base and breast covered with small cycloid scales. Basicaudal scales ctenoid. Belly covered with very small cycloid scales. Sides of head naked. Midline of nape naked, sides scaled forward to above middle of operculum.

Colouration of fresh paratype from Solomon Islands (BPBM 17508): Head and body faint blue, narrow oblique orange bands with dark margins, width of bands about equal to pupil diameter. An oblique band from lower margin of eye to end of jaws. A bar dorsally between eyes. An oblique orange bar from midline of middle of nape extending downward over upper two-thirds of operculum. A band from behind middle of first dorsal fin extending downward and slightly forward onto sides of belly. Two bands below second dorsal. A short band on upper two-thirds of caudal peduncle. A crescent-shaped narrow orange band at base of caudal fin, with extensions along lowermost and uppermost caudal rays. A small orange spot behind middle of eye. Body with small scattered irregularly shaped orange blotches, which form vertical rows. First dorsal black with a white margin, with white spots, about equal in size to pupil diameter, forming distinct rows anteriorly, irregularly placed posteriorly. A large black spot, slightly larger than eye, centred on fifth dorsal spine, surrounded dorsally and laterally with a white rim; ventrally connected to orange band on body. Second dorsal with distal margin blue, covered with small blue spots or blotches forming rows sloping downward and backward. Spots surrounded by narrow orange lines. Caudal fin blue, with some yellow near base. Anal fin bluish white, with bright blue stripe along distal margin; a broad faint yellow stripe proximally; and a third bright blue stripe between second and base of fin. Anal clear or with dusky stripes replacing blue stripes. Pectoral and pelvic dusky.

Distribution and Ecology

Amblyeleotris randalli is known from Indonesia, Palau, the Admiralty Islands, New Britain, Philippines and Solomon Islands. Although specimens

have not been taken in Australia, the junior author has photographed this species off Cairns, Queensland.

Randall (pers. comm.) noted that this species occurs in burrows with an olivaceous alphaeid shrimp, with white, short transverse marks. The species in known from depths of 25 to 48 m.

Derivation of Name

The species is named for J.E. Randall, who first brought this species to our attention.

Relationships

Amblyeleotris randalli differs from *A. fontanesii*, *A. gymnocephalus* and *A. sungami* in having fewer dorsal rays and separate pelvic fins. *A. japonicus*, also has higher dorsal ray counts than *A. randalli*. *A. randalli* differs from *A. fasciatus* and *A. guttatus* in lacking predorsal scales. The species is most similar to *A. steinitzi*, *A. maculata*, *A. delicatula*, *A. exilis* and *A. periophthalmus* in fin ray counts, but differs from those species in colouration and in having the pectoral base scaled and in having a higher first dorsal fin.

Superficially, the species is similar to the nominal *Batman insignitus* Whitley (1956). The gill opening in the holotype of *Batman* (AMS I4299) is more restricted, ending under the posterior border of the preoperculum, the scales are cycloid, and there are 13 dorsal and 12 anal rays, all characteristics of the genus *Cryptocentus*. Consequently, we regard *Batman* as a junior synonym of *Cryptocentus*.

Material Examined

Holotype: BPBM, 20809, a 73.2 mm female; Philippine Islands, Samilon Island, 22 m. Paratypes: BPBM 17508, 1(52); Guadacanal, Solomon Islands, 11 km west of Honiara, 48 m. AM I17901-001, 1(35); Guadacanal, Solomon Islands, 11 km west of Honiara, 33 m. BMNH 1977.9.20: 1, 1(37), New Britain, BMNH 1977.9.20: 2, 1(36), Admiralty Islands. BPBM 9444, 1(61), Palau Island, Augulpelu Reef, 33 m. WAM P25235-021, 1(58), Ambon, Molucca Is., Indonesia, 25 m.

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